

# Infographic. Thermoregulatory impairment in athletes with a spinal cord injury

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# Infographic. Thermoregulatory impairment in athletes with a spinal cord injury

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Presented in this infographic is a summary of studies investigating the thermoregulatory impairment of athletes with a spinal cord injury (SCI) during real-world sporting scenarios.<sup>1-3</sup> The infographic depicts the heightened thermal strain experienced by athletes with tetraplegia (high-level lesions), both compared with athletes with paraplegia (low-level lesions) and within the sport of wheelchair rugby. In addition to the cooling interventions presented, the infographic highlights the significant need for appropriate interventions to reduce the risk of overheating and potential performance decrements.<sup>4</sup> This infographic was field tested with those who work within a wheelchair sports environment, ranging from practitioners, researchers, athletes with an SCI and sports clinicians. The experimental studies were also designed in consultation with the wheelchair rugby coaches and players.

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**Correction notice** This article has been corrected since it published Online First. The contributors statement has been corrected.

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**Contributors** All the authors were all involved in the design, analysis and contributed towards writing of the manuscripts of the studies highlighted in the infographic. All authors wrote the manuscripts highlighted in the infographic. KEG and VLG-T were involved in the main design of the infographic.

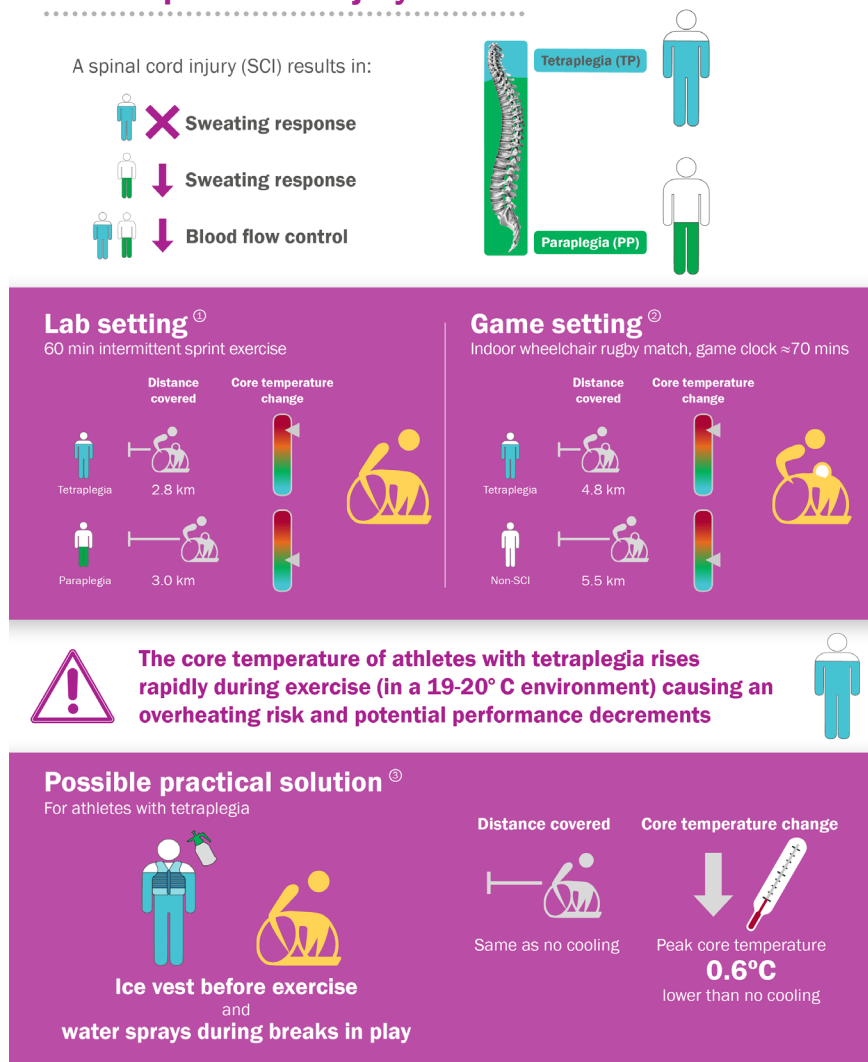
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## Thermoregulatory impairment in athletes with a spinal cord injury



## Summary

- TP: **heightened thermal strain** during simulated and wheelchair rugby match play compared to PP and non-SCI.
- **Employ appropriate cooling methods**, e.g. ice vests and water sprays.
- Alternative practical methods may also be beneficial.<sup>④</sup>

## References

- Griggs et al. (2015). Int J Sports Physiol Perform. DOI: 10.1123/ijsp.2014-0361
- Griggs et al. (2017). Int J Sports Med. DOI: 10.1055/s-0042-121263
- Griggs et al. (2017). J Sci Med Sport. DOI: 10.1016/j.jsams.2017.03.010
- Griggs et al. (2015). Sports Med. DOI: 10.1007/s40279-014-0241-3

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## REFERENCES

- 1 Griggs KE, Leicht CA, Price MJ, *et al.* Thermoregulation during intermittent exercise in athletes with a spinal-cord injury. *Int J Sports Physiol Perform* 2015;10:469–75.
- 2 Griggs KE, Havenith G, Price MJ, *et al.* Thermoregulatory responses during competitive wheelchair rugby match play. *Int J Sports Med* 2017;38:177–83.
- 3 Griggs KE, Havenith G, Paulson TAW, *et al.* Effects of cooling before and during simulated match play on thermoregulatory responses of athletes with tetraplegia. *J Sci Med Sport* 2017;20:819–24.
- 4 Griggs KE, Price MJ, Goosey-Tolfrey VL. Cooling athletes with a spinal cord injury. *Sports Med* 2015;45:9–21.